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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference XA1687	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/04222	International filing date (day/month/year) 30.09.2003	Priority date (day/month/year) 01.10.2002
International Patent Classification (IPC) or both national classification and IPC G01N17/04		
Applicant BAE SYSTEMS PLC et al.		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 3 sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input checked="" type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>		
Date of submission of the demand 28.04.2004	Date of completion of this report 11.01.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Strohmayer, B Telephone No. +49 89 2399-2669	



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/GB 03/04222**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-14 as originally filed

Claims, Numbers

1-22 received on 03.12.2004 with letter of 03.12.2004

Drawings, Sheets

1-4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 21,22

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for the said claims Nos. 21,22

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the Standard.

☐ the computer readable form has not been furnished or does not comply with the Standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-20
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-20
Industrial applicability (IA)	Yes: Claims	1-20
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB 03/04222

X1=US5446369

X2=US4780664

X3=C.G.Moore et al: "Instrumentation for measurement ..."

X4=JP59159061

X5=EP932037

DY6=US6383451

X7=JP1197629

X8=US3148348

X9=EP528554

PX10=US2003/029232 (the validity of the priority cannot be checked during preliminary examination. The relevance of the indications below with respect to PX10 should thus be considered with this proviso)

Y11=US4380763

Y12=US5338432

A13=Kim et al.: "Utilization of thin film electric resistance probe for ..."

A14=SU1085871

1. The subject matter of claim 1 is obvious from a combination of DY6 and X5:

DY6 (abstract, Fig.1) discloses all features of claim 1 except the feature that the tracks follow a path which includes a plurality of mutually inverted generally U-shaped bends, since the tracks follow a straight path in DY6.

In order to solve the obvious problem of reducing the size of the sensor it would be obvious for the skilled person to provide tracks following a path as defined in claim 1, since in electrical resistance sensors these paths are generally used to reduce the size of the sensors, see for example X5, col.9, l.43-47 and col.10, l.9-11.

In the above discussion document DY6 could be replaced by A13 or (as regards the interdigitated electrode sensors) by X7 and document X5 could be replaced by any of X2, X3 or X4.

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2. The subject matters of dependent claims 2-20 are likewise not inventive:

2: X2; X3; X4; X5; DY6; X7; PX10;

3: X2; X3; X4; X5; X7; PX10;

4: X2; X4; DY6; X7; X8; PX10

5: matter of design

6: X2; X3; X5

7: X1; X2; X3; X4; X5; DY6; X7 (from Fig.3,4 it is clear that track 13 serves both as anode and as resistance sensor); X8; PX10

8,9: X1; X2; X3 (page 3, 3rd para.); X8; PX10

10: matter of design

11: X1 (col.13,l.1,2); X2 (col.4,l.12-20); X7 (Fig.1-4)

12: X7 (Fig.1-4)

13: X1 (col.4,l.30-32)

14: X1 (col.13,l.17-23); X2 (col.3,l.5 or col.5,l.12 "steel"); X3 (page 2, penultimate para. "steel"); X5; X8 (col.1,l.13 "steel" and claim 1 "ferrous metal"); PX10 (para.[27])

15: X1 (col.13,l.17-23)

16-19: X1 discloses that a plurality of sites are monitored in an installation (X1: for example col.1,l.56-58) and that the exposed sensor elements are fabricated with the same material as the structure of interest (X1: for example col.2,l.4-6); X9 (col.4,l.20ff; col.5,l.55-57); Y11 (col.2,l.16-26; col.4,l.4-7; col.5,l.10-52)

20: for example col.12,l.59 of X1; X9 (col.5,l.55-57); Y11

3. The subject matter of the claims is obscured by contradicting passages of the description:

Whereas dependent claim 13 defines in accordance with page 6,l.22 of the application, that the temperature sensor is a resistor, page 4, line 14 states in contradiction thereto that the temperature sensor is a thermocouple.

Whereas dependent claim 7 defines in accordance with page 6, line 12,13 and in accordance with the single electrode arrangement in Fig.1 that the sensor is an "electric resistance"-type sensor, page 4, line 13 and page 13,l.13 state in contradiction thereto that the sensor is of the "linear depolarisation resistance"-type, which would require two electrodes.

CLAIMS

1. A microsensor for detecting corrosive media acting on a metallic material when mounted in situ adjacent a location in the metallic material, the
5 microsensor including a plurality of corrosive tracks between common terminals, each of the tracks being exposed to the corrosive media and being formed as a patterned conductive thin film track following a path which includes a plurality of mutually inverted generally U-shaped bends.
2. A microsensor according to claim 1, wherein each said corrosive track
10 has a width which is substantially constant across its length.
3. A microsensor according to claim 1 or 2, wherein each said corrosive track is formed to meander across a surface portion of a common substrate.
4. A microsensor according to claim 3, wherein each said surface portion comprises one of a set of linear corridors on the common substrate.
- 15 5. A microsensor according to any preceding claim, wherein the minimum separation between adjacent corrosive tracks is preferably at least as great as the average width of said corrosive tracks.
6. A microsensor according to any preceding claim, wherein each said
20 bend has a minimum radius of curvature which is greater than half the average width of said corrosive tracks.
7. A microsensor according to any preceding claim, comprising a resistivity sensor having said plurality of corrosive tracks arranged to provide a measurable variation in resistivity in response to prolonged exposure to corrosive media.
- 25 8. A microsensor according to claim 7, comprising a reference sensor arranged to provide a measurable variation in resistivity in response to changes in temperature, the reference sensor having a similar temperature dependence as said resistivity sensor.

9. A microsensor according to claim 8, wherein the reference sensor takes substantially the same form as said resistivity sensor.
10. A microsensor according to claim 8 or 9, wherein said reference sensor is formed in an overlapping arrangement with said resistivity sensor.
- 5 11. A microsensor according to any preceding claim, comprising a galvanic sensor having at least one said corrosive track made of a first metallic material and at least one further thin film track made of a second, different, metallic material, the tracks being arranged to provide a measurable variation in galvanic voltage in response to exposure to an electrolyte.
- 10 12. A microsensor according to claim 11, wherein the galvanic sensor comprises a plurality of said corrosive tracks and a plurality of said further tracks, arranged in an interdigitated pattern.
13. A microsensor according to any preceding claim, comprising a resistance thermometer sensor, a platinum resistance thermometer for example, arranged
15 for measuring a temperature in the area in which the microsensor is mounted.
14. A microsensor according to any preceding claim, wherein the corrosive tracks are made of a metallic alloy.
15. A microsensor according to claim 14, wherein at least one corrosive tracks are made of an aluminium alloy.
- 20 16. Apparatus comprising a metallic component made from a metallic alloy in bulk form and a microsensor according to claim 14 or 15 mounted in situ adjacent a location in the component for detecting corrosive media acting on the bulk alloy,
the bulk alloy having a main metal constituent which is the same as the
25 main metal constituent of the track alloy, and at least one alloying metal constituent which is the same as the alloying metal constituent of the track alloy.
17. Apparatus according to claim 16, wherein the proportion of the alloying constituent in the track alloy is similar to the proportion of the alloying

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constituent of the bulk alloy, to within 3% of the total constituents of the bulk alloy.

18. Apparatus according to claim 16, wherein the proportion of the alloying constituent in the track alloy is similar to the proportion of the alloying constituent of the bulk alloy, to within 1% of the total constituents of the bulk alloy.

19. Apparatus according to any of claims 16 to 18, further comprising a second metallic component made from a different metallic alloy in bulk form and a second microsensor according to claim 14 or 15 mounted in-situ adjacent a separate location, which is in the second component, for detecting corrosive media acting on the different bulk alloy,

the different bulk alloy having a main metal constituent and at least one alloying metal constituent,

- the second microsensor having at least one thin film track made from a metallic alloy which is different to the metallic alloy from which the at least one track of the first-mentioned microsensor is made and having a main metal constituent which is the same as the main metal constituent of the different bulk metallic alloy, and at least one alloying metal constituent which is the same as the main alloying metal constituent of the different bulk metallic alloy.

20. An aircraft including apparatus according to any of claims 16 to 19.
21. A method of manufacture of a microsensor according claim 14 or 15, comprising depositing the alloy of said at least one thin film track onto a substrate to form a thin film and annealing the thin film to encourage metallic grain growth.
22. A method according to claim 21, wherein the depositing step comprises sputtering the alloy of the said at least one thin film track onto the substrate.